

It is a most valuable principle in physical science, never to be lost sight of, that we must not seek to explain by the assumption of new species of force or action any phenomena which have not been recognised to be inexplicable by means of properties of matter or motion already proved to exist. Before leaving this subject I must refer to the extraordinary fact, lately ascertained, that the spectrum of the head of one of the smaller comets is that of incandescent vapour of *carbon*, of a substance which, with the most tremendous heat attainable in our laboratories, we cannot even melt, much less reduce to vapour: so that to find its spectrum we are obliged to employ it as it exists in olefiant gas or other combined form. But it is premature to speculate further on such incomplete data as we yet possess with respect to the spectroscopic appearances of comets. It is not rash to venture the prediction that the very first application of the spectroscope to a really fine comet will give us at least as much additional insight into the nature of these bodies as the total eclipse of 1868 gave with regard to the atmosphere of the sun.

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DANA'S MINERALOGY

A System of Mineralogy: Descriptive Mineralogy comprising the most Recent Discoveries. By James Dwight Dana, Silliman Professor of Geology and Mineralogy in Yale College, etc., aided by George Jarvis Brush, Professor of Mineralogy and Metallurgy in the Sheffield Scientific School of Yale College. Fifth edition, 8vo. pp. 827, figures 617. (London: Trübner & Co.)

II.

EXCEPT in the subdivisions of the silicates, Professor Dana has adhered pretty nearly to the classification adopted in his fourth edition; which accords also in its general features, though not in its details, with that on which the minerals in the British Museum are arranged. The arrangement of the silicates in his new edition is a step that must be called tentative towards a simpler and more philosophical classification of these numerous and important salts. We certainly feel some hesitation in adopting either the terminology or the divisions Professor Dana introduces. The terms bi- and uni-silicate are not happy for the expression of oxygen ratios; not so happy, for instance, as the term singulo-silicate used for the latter by Rammelsberg, or the ortho-silicates of Odling. We own to a partiality for the view of Dr. Odling regarding the different classes of silicates, on the ground partly of the harmonious relations he introduces between these and other multibasic salts, and also from the satisfactory way in which these very important minerals group themselves as ortho-, para-, or meta-silicates. We may take another occasion for illustrating this, and pass on to Professor Dana's new and scholarlike handling of the whole question of nomenclature.

Our author has shirked no labour or odium in the way he has faced this question. That trivial names are absolutely necessary in mineralogy no one who has dealt with the subject at all philosophically will question. Even such semi-trivial terms as ferrous aluminic garnet, calcio-ferric or magnesio-aluminic garnet, are almost too long for use; but how should the composition of these bodies be described by names purely chemical?

Generally, therefore, we feel bound to acquiesce in the

use of a trivial name for each mineral, and to subscribe to the rules Professor Dana has laid down for such names. These may be stated as the use of the termination *-ite*, except in names that have a hold on literature or use; some care in adhering to proper etymological principles in derivative names; and, finally, the law of priority of claim accorded in general, but with proper exceptions, to the first describer of a mineral. In applying these rules, Dana retains, so far as we can enumerate them, some thirty-four names not ending in *-ite*, and changes about forty-seven of the names more or less generally received.

We cannot, however, concur in the Professor's criticism in his derivation of the spellings in all cases from the pseudo-Latin names given to metals by the chemist. Thus, to call nickeline "niccolite" and not "nickelite" is to lose sight of an essential part of the original form of a word of which, in fact, our familiar term "Old Nick" is the English shape. Surely, too, bismuth ochre should become not bismite, but bismuthite. Nor can we agree with the dismissal by Dana of the term hemimorphite, which was given to the monohydrated dizincous silicate by Kenngott. Our author reverts to the old name of calamine, between the use of which and of smithsonite, as names sometimes attached to the zinc carbonate, sometimes to the silicate, there has long existed a confusion that is best ended by the adoption of at least one new name. And Kenngott's term had at any rate this great merit, that it seized a characteristic of the crystallised silicate, by virtue of which it stands conspicuous among almost all other minerals, and certainly is distinguished from the other calamine, the character, namely, of being truly hemimorphous; that is to say, of presenting a given crystalline form all the planes that should occur on one side of a plane of symmetry, and none of the planes of that form that would, if the crystal were holosymmetrical, be met with on the other side of that plane of symmetry. We plead, therefore, strongly in behalf of Kenngott's name. As regards the merging of the term hornblende in that of amphibole as carried out by Dana, we would prefer to see the whole nomenclature of these augitic and hornblendic minerals so handled that we might have a general term for all the groups of minerals united under a common chemical type; and separate terms, still generic, that might embrace the minerals, whether of prismatic, oblique, or anorthic type, that present the kind of homœomorphism that demarks these groups. The trivial names for the different species or varieties under each group would remain nearly as they are. Now Professor Dana selects the term amphibole for the most general of these expressions, and he includes under a pyroxene sub-group enstatite (prismatic), wollastonite (oblique), and what he further calls pyroxene (oblique but homœomorphous with enstatite); and then after a spodumene sub-group he introduces an amphibole sub-group. We venture to think that the term "amphibolic minerals" used for the whole might well be made to embrace: Firstly, an augitic group, including as its members, (a) enstatite, with hypersthenic minerals, (b) diopside, with sahlite, hedenbergite, and the fassaite (aluminous varieties, c) spodumene and petalite, (d) achmite, (e) rhodonite and babingtonite; Secondly, a hornblendic group, embracing as its subdivisions, (a) kupfferite with anthophyllite, (b) tremolite, with actinolite, grünerite

and the pargasite (aluminous) varieties, (c) arfvedsonite; Thirdly, wollastonite.

Of course only a few leading varieties are here noticed. As regards other names introduced by Professor Dana, we are fain to accept even so uncomfortable a name as prochlorite in place of chlorite, a term to the chemist's ears so ambiguous in its sound. To most of Professor Dana's other changes, also, we with more or less of readiness subscribe; though against the barbarous conversion, not newly introduced into this edition of Dana, of one of the most ancient terms in mineralogy, pyrites, into pyrite, in flagrant defiance of all etymological principle, we must continually protest.

We have noticed the more important novel features in this fifth edition. There is still much to be said regarding the degree of fulness with which different parts of the descriptions of the minerals are given, such as the pyrognostic characters, and the treatment of the chemical analyses. But when we consider the vast amount of matter collected into some 800 closely-printed pages, the scrupulous care with which so enormous a number of references has been made to the labours of mineralogists, extending over the whole area of the scientific literary works of a century past—ay, and often into the two or three centuries before that; when we remember that the progress of the science up to 1868 is thus fully, conscientiously, and elaborately recorded, we can only thank Professor Dana, in the name of European mineralogists, for the very valuable volume by which he has so much lightened their labours; and with his name we must associate that of the accomplished mineralogist who has shared his labours, Prof. Brush. If in fulness their joint work does not come up to the now, alas! almost obsolete work of Hausmann, it is three times more portable. W. H. Miller's invaluable book, modestly called by him an edition of Phillips, is again a mineralogical crystallography. The only book that at present professes to cover the ground occupied by Professor Dana's work is the admirable *Manuel* of Des Cloizeaux, of which, however, only one volume has yet appeared, but which unites to the sort of originality in crystallographic and physical research which gives Miller's work its value, something of the universality of treatment which Dana gives to his mineral species. We wish, indeed, that M. Des Cloizeaux could have given up the microscopic fractions that characterise the French system of crystallographic notation, and torment the crystallographer's hardly-used eyes, for the more elegant notation of Miller, as he has in fact adopted the stereographic projection. But we look keenly forward to the publication of the second volume at the hands of the new member of the Institute; and, while we do so, we feel confident that as in matter it will be as masterly as the first, and as indispensable to the scientific mineralogist, so it will satisfy scientific needs that differ in kind from those felt by a large proportion of the practical men in whose hands Professor Dana's book will still be a standard treatise.

We have said enough to point out the extreme value of Professor Dana's book, which, taken as an indication of the present state of science in America, is of the best possible augury; and we may add that mineralogy is not the only science represented in high-class American text-books. Chauvenet's "Astronomy" is another instance which at once suggests itself.

N. STORY MASKELYNE

BIBLIOTHEQUE DES MERVEILLES

L'Acoustique, ou les Phénomènes du Son. Par R. Radau. Ouvrage illustré de 114 vignettes.—*L'Optique.* Par F. Marion. Ouvrage illustré de 70 vignettes sur bois, et d'une planche tirée en couleur.—*L'Electricité.* Par J. Baille. 71 vignettes.—*Les Forces Physiques.* Par Achille Cazin. 58 vignettes. (Hachette; Paris and London.)

Thunder and Lightning. By W. de Fonvielle. Translated from the French and edited by T. L. Phipson, Ph.D., F.C.S.—*The Phenomena and Laws of Heat.* By Achille Cazin. Translated and edited by Elihu Rich. (London: Sampson Low, Son, & Marston.)

THESE works form part of a series having the general title, "Bibliothèque des Merveilles," which will be extended to about a hundred volumes, and will form a Cyclopædia of the more prominent wonders of the universe—of all that is "most admirable in Nature, in the sciences, in industry, in history, in man." It is published under the direction of M. Edouard Charton, and the main object to be attained by it is "seconder l'heureux mouvement qui porte aujourd'hui toutes les classes de la société vers l'instruction." The majority of the volumes which have already appeared relate to applied science, and here we may remark that MM. Hachette have done much to disseminate a taste for science among all classes by the publication of works suited to the most varied capabilities and the most varied means. Commencing at one end of his series, we have twenty and thirty franc "éditions de luxe" of the *Le Ciel* and *Phénomènes de la Physique* class; and, passing through various gradations, we arrive at length at the two-franc volumes of the "Bibliothèque des Merveilles." The last volumes have much to recommend them; they are, for the most part, popular in style; they are well illustrated, well printed, and undeniably cheap, and they are written by men, among whom are many who are engaged in giving instruction in one or other of the multifarious educational establishments of France. We have no series of books in this country to compare for excellence and cheapness with these, and this mainly arises from the fact that science does not form an essential part of our educational system, as it does of that of France. The volumes of the "Bibliothèque des Merveilles" can be sold in France at less than one-half the price which would be demanded in this country, because the publisher can feel certain when he issues his work that a large number will find their way into the various schools and colleges of the Empire.

M. Radau's "Acoustics" is quite a type of a French popular scientific work; with every desire to convey as much information as possible, the author will not give up a certain amount of light amusing matter, and a popular style. How surprised we should be in this country to see a woodcut of a dancing bacchante (somewhat like Salvioni) in a chapter entitled "Le Timbre," and not far from a representation of the "Progression d'une vibration longitudinale." A vague unsentimental reader might be led to find an analogy between Cagniard de la Tour's syren and Radau's bacchante; the bacchante occupies a full page, while the syren has a little strip of space in the text, and we ultimately discover that the former has been introduced solely for the purpose of showing the *crotalon*. Among the many good features of this book,